WHAT IS CLAIMED IS

1. A semiconductor device comprising:

a gate insulating film including a first dielectric film of $Hf_xAl_{1-x}O_y$ in which x is $0.7<x<1$, formed over a semiconductor substrate, and a second dielectric film different from the first dielectric film formed over the first dielectric film; and

a gate electrode formed on the gate insulating film and including a polycrystalline silicon film.

2. A semiconductor device according to claim 1, wherein

the second dielectric film is a nitrogen-content silicon-based insulating film, an alumina film or an $Hf_xAl_{1-x}O_y$ film in which x is $0<x\leq0.7$.

3. A semiconductor device comprising:

a gate insulating film formed on a semiconductor substrate and including an $Hf_xAl_{1-x}O_y$ film having a thickness below 1 nm in which x is $0.7<x<1$; and

a gate electrode formed on the gate insulating film and including a polycrystalline silicon film.

4. A semiconductor device according to claim 3, wherein

the gate insulating film further including a nitrogen-content silicon-based insulating film formed between the semiconductor substrate and the $Hf_xAl_{1-x}O_y$ film.

5. A semiconductor device according to claim 4,

wherein

the nitrogen-content silicon-based insulating film is a silicon nitride film or a silicon oxynitride film.

6. A method for fabricating a semiconductor device comprising the steps of:

forming over a semiconductor substrate a first dielectric film of $Hf_xAl_{1-x}O_y$ in which x is $0.7<x<1$;

forming a second dielectric film different from the first dielectric film over the first dielectric film; and

forming a polycrystalline silicon film over the second dielectric film.

7. A method for fabricating a semiconductor device according to claim 6, wherein

the first dielectric film and the second dielectric film are formed continuously in the same film forming chamber.

8. A method for fabricating a semiconductor device according to claim 6, wherein

the second dielectric film is an alumina film or an $Hf_xAl_{1-x}O_y$ film in which x is $0<x\leq0.7$.

9. A method for fabricating a semiconductor device according to claim 7, wherein

the second dielectric film is an alumina film or an $Hf_xAl_{1-x}O_y$ film in which x is $0<x\leq0.7$.

10. A method for fabricating a semiconductor device according to claim 6, wherein

the second dielectric film is a nitrogen-content

silicon-based insulating film.

11. A method for fabricating a semiconductor device comprising the steps of:

forming a first dielectric film of a silicon-based insulating film over a semiconductor substrate;

forming over the first dielectric film a second dielectric film of $Hf_xAl_{1-x}O_y$ having a thickness below 1 nm in which x is $0.7<x<1$; and

forming a polycrystalline silicon film over the second dielectric film.

12. A method for fabricating a semiconductor device according to claim 11, wherein

the first dielectric film is a silicon oxynitride film.

13. A method for fabricating a semiconductor device comprising the steps of:

forming a dielectric film of $Hf_xAl_{1-x}O_y$ over a semiconductor substrate; and

forming over the dielectric film a silicon film at a temperature of below 550 °C.

14. A method for fabricating a semiconductor device according to claim 13, wherein

in the step of forming the silicon film, the silicon film is formed in an amorphous state.